CLAIMS:

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

Claims 1-10 (canceled)

11 (new) An improved axial fan, the improvements comprising:

a) A fan housing enclosure having an inner cavity defining an air flow passageway having large radii corners and having a first opening of square cross section including a self-opening shutter assembly mounted therein, wherein said shutter assembly comprises a square frame on which are pivotally mounted at its opposite ends, a plurality of pivoted vanes including a central operative vane comprising pivoted ends interconnected with cranks and at least a tie rod, wherein said vanes are normally adapted to be mounted horizontally or vertically across said intake opening for closing or opening said first square intake opening of said fan housing enclosure, wherein said self-opening shutter assembly further comprises an operative extension spring with one end connected to said square frame and the other end connected to said tie rod for urging said horizontal or vertical mounted pivoted vanes toward a full wide position regardless of the horizontal or vertical mounting thereof.

b) An axially spaced second opening including a safety guard,

c) A central structural member extending transversally across said inner cavity, axially spaced between said openings and connecting two opposite sides of said fan housing enclosure and comprising a pair of airfoil wings for guiding efficiently the air flow, wherein said central structural member further comprises a pair of L shaped supports secured to said opposite sides of said housing enclosure,

d) A drive motor that is either electric or hydraulic slidably mounted on a rigid base secured to said central structural member, wherein the drive motor comprises a shaft and a drive pulley for transmitting power,

e) A propeller assembly including a propeller rotating around an axis and comprising a hub with a pulley axially adjacent said hub which is secured to one end of a rotating shaft journaled in a pair of pillow blocks bearings secured to said central structural member substantially in the middle thereof, coaxially with the propeller axis of rotation for rotatably holding said rotating shaft and said propeller assembly, wherein said propeller assembly comprises a plurality airfoil shaped blades pivotally mounted and secured on said hub and extending radially outwardly from said hub toward a tip region of said airfoil shaped blades,

f) A Venturi built of one piece with said fan housing enclosure, substantially entirely surrounding at closed distance the blades tips of the propeller blades,

g) A centrifugal shutter mechanism, connected to one end of said rotating shaft adjacent said central operative vane of said shutter assembly adapted for operating said self-opening shutter assembly either when said shutter vanes are positioned horizontally or vertically across said intake opening of said fan housing enclosure.

12. (new) The fan as defined in claim 11, wherein said centrifugal shutter mechanism comprises a hermetic housing assembly, said housing being made up of a pair of matching molded shells comprising a pair of oppositely radially extending cavities, each cavity including a pair of radially movable masses equally spaced apart relative to the propeller rotational axis and operatively connected to an axially sliding reciprocating actuator via a pair of arms pivotally attached to said hermetic housing, said arms being operatively connected at corresponding ends respectively to said axially sliding actuator located in an axially extending cavity of said hermetic housing coaxially to said propeller

rotational axis and positioned adjacent to said central operative vane of said shutter assembly, wherein said axial sliding actuator comprises an internal operative spring and an operative flanged end located in proximity to the central operative vane, said axial sliding reciprocating actuator being movable between an outwardly position, frictionally engaging a convex shaped cam secured to said central operative vane substantially in the middle thereof to rotate and shut said central operative vane and the other vanes by the biasing force of said internal operative spring and an inwardly position away from said central operative vane for causing the opening of said self-opening shutter assembly, in response to the rotation of said propeller, said opening and closing controlled by the minimum speed of operation of said fan.

13. (new) The fan as claimed in claim 11, wherein said plurality of radial airfoil blades comprise radial adjustable flexible shoes mounted at the tips of each blade for adjusting the tip blade clearance with said Venturi of said fan housing enclosure, wherein said improved fan housing enclosure further includes a rigid ring positioned adjacent to said propeller blade tips for resisting radial movements of said fan housing enclosure with respect to said propeller blade tips.

14. (new) The fan as claimed in claim 13, wherein said adjustable flexible means are made of soft rubber adapted to adjust and minimize the clearance between said Venturi and said propeller blades tips for preventing air from flowing back around said propeller blades tips for increased performance of said fan, thus enabling it to work efficiently at higher static pressure with reduced air vortices, vibrations and noise.

15. (new) The fan as claimed in claim 11, wherein said improved compact housing enclosure comprising a built in Venturi is normally slanting away at an angle of a range

between 7 to 10 degrees from said building such that dust laden air passing therethrough is prevented to settle inside said fan housing that is practically a self-cleaning.

16. (new) The fan as claimed in claim 1, wherein said square frame normally made of extruded aluminium or plastic elements comprises a top and bottom horizontally extending rails positioned across the width of said square intake opening and a pair of jambs attached to and holding in spaced relationship said top and bottom rails, wherein said pair of jambs extend substantially along the fully vertical length of said square intake opening, wherein said top and bottom rails include a longitudinal extending cavity adapted to retain bearing rods means comprising a plurality of longitudinal spaced vertically aligned holes adapted for receiving said pivoted ends of said vanes extending outwardly from the vane ends and being arranged to mounted vertically across said inlet opening of said fan housing enclosure, wherein as said vanes able to rotate around their vertical longitudinal axis extending along the vertical length of the fan intake opening, such that gravitational collection of dust on the vertical surfaces of said vanes is substantially prevented.

17. (new) The fan as claimed in claim 11, wherein said shutter assembly frame members comprises a substantial large radius to form a bell shaped mouth so that turbulence in the air flow through said inlet opening is minimized.

18. (new) The fan as claim 11, wherein said shutter square frame when assembled and fitted into said fan housing square intake opening forms an enclosed perimeter protected area for preventing dusty air to dirty said cranks, said tie rod and said operative extension spring of said shutter assembly preventing jamming of the self-opening shutter and minimizing maintenance thereof.

19. (new) The fan as claimed in claim 11 and 12, wherein said centrifugal shutter mechanism is adapted to operate relatively large and heavy shutter assembly and comprises means for rotatably connecting said shutter central operative vane for pushing or

pulling it from a first position wherein said vanes closes off the air passage through the inlet opening or outlet opening of said fan housing enclosure, regardless if said vanes are mounted horizontally or vertically.

20. (new) The fan as claimed in claim 11, wherein said centrifugal shutter mechanism comprises at least a pair of arms pivotally mounted into said hermetic housing equally spaced in rapport to the fan axis of rotation, each of said arms being movable connected at corresponding ends with said axial sliding reciprocating actuator for transferring radial movements of said radial centrifugal masses, upon fan rotation, to axially movements of said axial sliding reciprocating actuator so that said masses and said arms will swing in unison to prevent vibrations thereof.

21. (new) The fan as claimed in claim 11, wherein said vanes of said shutter assembly comprise mating surfaces with overlaps, so that when said compression spring of said axial sliding reciprocating actuator provides a positive force against said convex shaped cam of said central operative vane the mating surfaces of said overlaps will be firmly pressed against to each other, such that leakage across said vanes is substantially uninhibited to provide an air tight barrier against air movement through the shutter, preventing convection heat losses through the shutter assembly.

22. (new) A shutter assembly for use in connection with an air intake opening or an air discharge opening of an axial fan, said fan comprising a housing enclosure including a drive motor coupled with a propeller adapted for forcing and directing an air flow therethrough, wherein said self-opening shutter assembly comprises a shutter frame comprising an inlet bell mouth, a top and bottom rails horizontally extending along the width of said intake opening and including longitudinal extending cavities comprising bearing means including a bearing rod with a plurality of laterally spaced vertical aligned holes disposed throughout the length of said top and bottom rails for journaling a plurality of pivoted vanes including a

central operative vane vertically disposed next to one another and extending from said top to said bottom rails of said shutter frame along the height of said intake opening and a pair of vertically positioned side jambs attached and holding said top and bottom rails in spaced relationship, said vanes being connected with cranks and at least one tie rod, wherein said vanes vertical disposition prevent gravitational collection of dust on the vertical surfaces of said vanes allowing the fan working on conjunction with said vertical pivoted vanes to maintain a constant air flow all the time, said shutter assembly further comprising: first spring means associated to centrifugal actuating means adapted for firmly closing said shutter vanes when the fan is at rest and spring means connecting said tie rod and said shutter frame working concomitantly with the air flow generated by said propeller for wide open said vanes by the movement of the air therethrough upon fan operation and cam means cooperating with said centrifugal means for closing said vanes when the fan is at rest, said cam means being mounted on said central operative vane substantially in the middle thereof for cooperating with said centrifugal shutter mechanism spring means for causing the opening or the closing of said shutter assembly upon fan operation, said opening and closing controlled by the minimum speed of operation of said fan.